Basc.1102

KERALA AGRICULTURAL UNIVERSITY

B.Tech.(Food Engg.) 2017 Admission

I Semester Final Examination-January-2018

Engineering Mathematics I (3+0)

Marks: 50

Time: 2 hours

I **Fill in the blanks** **(10x1=10)**

1 If λ is an eigen value of a matrix A, then ---------- is an eigen value of A^{-1}.

2 The sum of the eigen values of a matrix A is equal to ----------

3 If $|A| > 0$, then the quadratic form X^TAX is ----------

4 $\lim_{x\to 0} \frac{\sin x}{x}$ =----------

5 If u is a composite function of t defined by $u = f(x,y)$, $x = \varphi(t)$, $y = \psi(t)$, then the total derivative $\frac{du}{dt}$ = ----------

6 If δx is the error in x, then the relative error is----------

Define the following

7 Define symmetric matrix.

8 Define rank of a matrix.

9 State L'Hospital's rule for the indeterminate form $\frac{0}{0}$.

10 Write the formula for radius of curvature in Cartesian form.

II **Answer any FIVE of the following** **(5x2=10)**

1 If u and v are functions of two independent variables x and y, then define the Jacobian of u, v with respect to x, y.

2 State Cayley Hamilton Theorem.

3 Define homogeneous function.

4 Define a quadratic form.

5 Find the eigen values of the matrix $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$.

6 Write the formula for Taylor series expansion of a function about the point x_0.

7 Define Gamma function.

P T O

III **Answer any FIVE of the following.** **(5x4=20)**

1 Derive the reduction formula for $\int \sin^n x \, dx$.

2 Using the formula for volumes of revolution, derive the volume of a sphere of radius a.

3 Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and hence find its inverse.

4 Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ by reducing to its normal form.

5 Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

6 Evaluate $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = x^3+y^3-3axy$.

7 Evaluate $\Gamma(\frac{1}{2})$

IV **Answer any ONE of the following** **(1x10=10)**

1 Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to its canonical form and specify the matrix of the transformation.

2 Find the area enclosed between the curves $y^2 = 4ax$ and $x^2 = 4ay$ using double integral.

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